Easter Islander Origins: Non-metric Cranial Trait Comparison Between Easter Island and Peru

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Introduction

While the ethnographic, linguistic and archaeological findings of Easter Island research are well documented, there is noticeably less osteological information available in the literature (some studies include Gill 1988, 1990; Imbelloni 1951; Meyer and Jablonowski 1901; Petri 1936; von Bonin 1931; Gill and Owsley 1993; Gill et al. 1983; Murrill 1968; Owsley et al. 1983, 1985, 1993).

This paper summarizes results from my recent Master's thesis and compares an Easter Island skeletal sample to one from Peru to test Heyerdahl's hypothesis of a prehistoric American migration to Easter Island (Heyerdahl 1989). This hypothesis has been heavily criticized by members of the anthropological community. Murrill (1968:83-84) states: "the evidence from physical anthropology shows that the Easter Island physical type . . . is definitely Polynesian." However, a study of rocker-jaw mandibles by Gill (1990) did not eliminate the possibility of a South American genetic influence on the Easter Island population. Also, Marshall and Snow (1956:423-424), in a study of Polynesian cranial metric traits, notes that the Easter Island sample deviated considerably from the other Polynesian samples. They add that the extreme deviation is not correlated with as great a linguistic deviation. The total cultural configuration does vary to a marked degree from that of Central Polynesia, but this appears to be related to environmental limitations. Is this variation from Polynesian type due solely to genetic drift, under conditions of extreme isolation, or due to one of several hypotheses of racial "wave?"

Methodology

The data from the skeletal remains used in this study (consisting of 438 Easter Islanders and 100 Peruvians from the sites of Ancon and Makat Tampu) were collected over the past thirteen years by George W. Gill of the University of Wyoming and by graduate students under his supervision. The Easter Island skeletal remains are from sites located throughout the island and were separated into regions according to tribal boundaries noted in the ethnographic literature (Gill 1993; Métraux 1940; Zimpel and Gill 1986) as well as geographic considerations (Figure 1). The five regions have been designated as the North Coast (consisting of the Ahu Nau Nau, Anakena Beach and North Coast sites), Northeast (the Hekii and Mahatua sites), South Coast (the Ana Mahiha, Koe

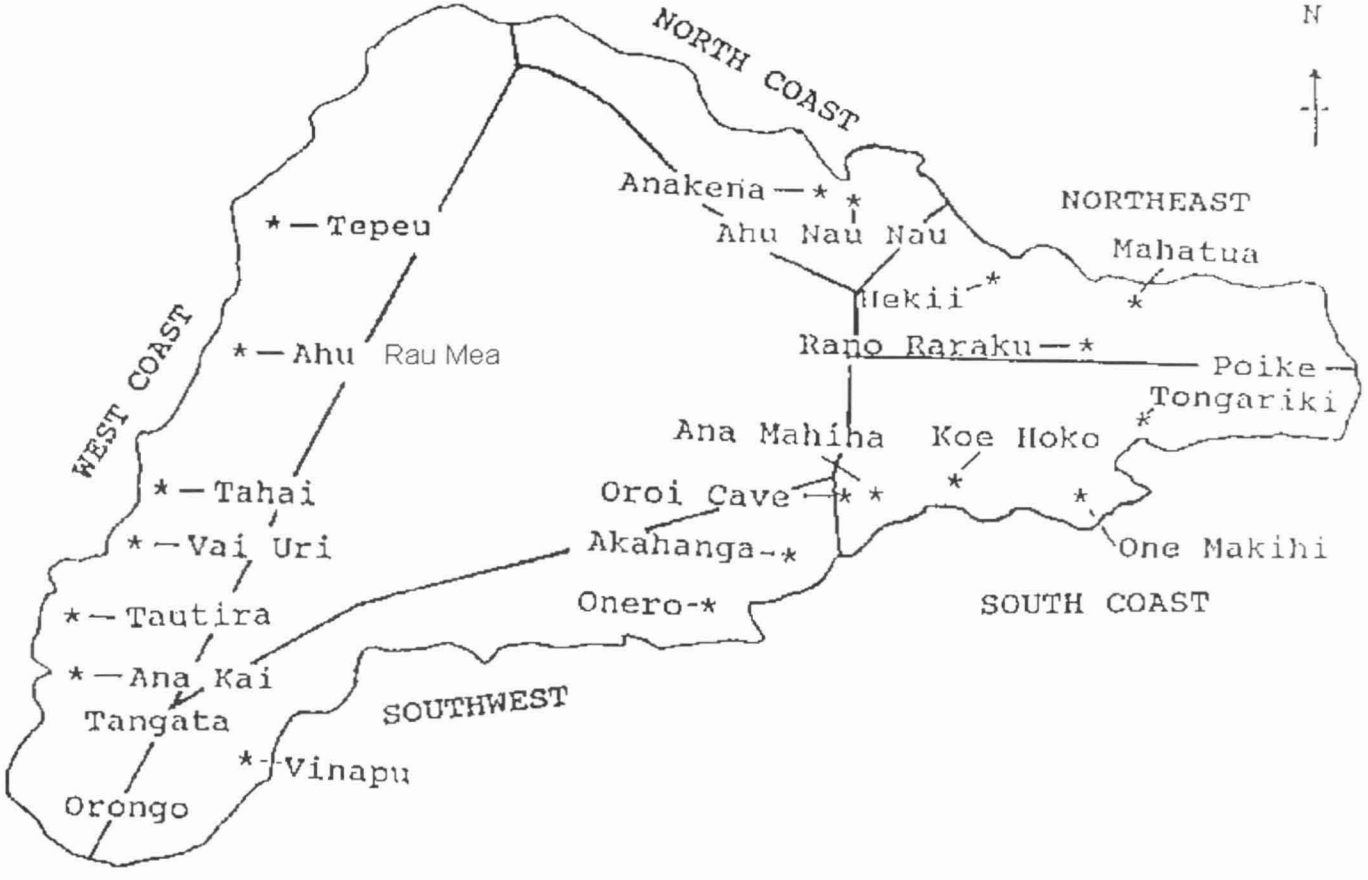

Figure 1. Easter Island Site Map (Adapted from Métraux 1940)

Hoko, One Makihi, Oroi Cave and Tongariki sites), Southwest (represented by the Akahanga, Onero and Vinapu sites) and West Coast (represented by the sites of Ana Kai Tangata, Ana Tepahu, Ahu Kihi Kihi Rau Mea, Tahai, Tautira, Tepeu and Vai Uri). The Peruvia data was collected in 1981 by Gill's assistant, Scott J. Baker, as a part of the 1981 Easter Island Anthropological Expedition.

Comparisons between the Easter Island and Peruvian samples were conducted for 45 non-metric cranial characteristics from Page 3 of the University of Wyoming osteology data form. The male and female samples were combined unless significant differences were found between them. Likewise, the right and left sides were also combined except when significant differences were found. Chi square statistical tests were conducted using the Kwikstat program to determine if any differences existed. In all cases alpha was .05. Traits of the mandible were not compared statistically due to small sample sizes for all the regions.

Stevenson (in Gill 1986a) has shown that the Easter Island skeletal material is Late Prehistoric (1680-1722) and Protohistoric (1722-1868). A very thorough study exists (Owsley et al., 1994) which demonstrates extremely low outside (i.e. Caucasoid) genetic influence within this sample. The low outside influence should not affect the results of this study.

Background

The earliest descriptions of Easter Island's inhabitants are varied and appear contradictory. Captain James Cook recognized the islanders as Polynesians (Métraux 1940). However, Routledge noted that some individuals were fair-skinned and had red hair and that a large number appeared completely white, not differing much from Europeans (Routledge 1919). Another early visitor to the island, the Frenchman Pierre Loti, also noticed natives with red hair and compared them to mummies found in Peru: "Ses cheveux ebouriffes sont d'une nuance rouge inconnue en Europe (un peu celle des perruques des momies d'Incas)" (1988:25-26). The European discoverer of Easter Island, Roggeveen, mentioned how "one specific class of islanders, those with fair skin, wore large chocks or disks in their artificially extended earlobes" (Heyerdahl 1989:23; also see Englert 1970).

Métraux (1940:71) mentions that Thomson and Vives Solar refer to Long-ears and Short-ears as different races between which the island was equally divided. The Long-ears had the eastern part of the island . . . the Short-ears had the whole western part of the island. Vives Solar attributes to the Long-ears the carving of the statues [*moai*] and the building of the *ahus*.Their houses were of stone, while those of the Short-ears were made of light frame and straw.

However, Métraux (1940:71) mentions that "Vives Solar's comparison between Short-ears and Long-ears seems to be based more on personal inferences or misinterpretations than on native evidence." The artificially extended ear-lobes is not a racial characteristic but could represent cultural differences between two different population groups. Heyerdahl (1989:128), in support of his American migration hypothesis, indicates that "the Mochica people, who founded the first pre-Inca kingdom on the northern coast of Peru, always depicted themselves as Long-ears."Métraux (1940:124) notes the existence of two main groups on the island: "The western and northwestern tribes were called Tuu . . . or *mata nui* (greater groups), and the eastern tribes were the people of Hotu-iti or *mata iti* (lesser groups)." Each tribe within Tuu and Hotu-iti occupied a separate tribal area (McCoy 1973, Métraux 1940). There is evidence that these two groups were culturally separated. Gill (1988:13) notes:

> the boundary between the North Coast population at Ahu Nau Nau and their neighbors at Ahu Mahatua was obviously an important one with no sign of gene flow across the boundary. . . . Our evidence also suggests that the Ahu Nau Nau population (assumed Miru, or royal lineage) was highly endogamous. Even though they tolerated outmarriage with departure from the lineage area, marriage into the group was apparently not permitted.

The practice of tribal endogamy is supported in both the ethnographic literature and osteologically (see Métraux 1940 and Zimpel and Gill 1986).

Genetic similarities between inhabitants of Easter Island and the Marquesas Islands have been suggested. Gill and Baker (n.d.) noticed that the skeletal traits of Easter Islanders were similar to the Marquesas Islands inhabitants. However, Gill (1990:21) indicates that "the somewhat lower frequency of rocker jaws on Easter Island [48.5% compared to 72.6% to 90% elsewhere in Polynesia] . . . might possibly signify a non-Polynesian element."

In a study of A-B-0 blood group frequencies in Polynesia Simmons et al. (1955:687) notes:

> There is a close blood genetic relationship between American Indians and Polynesians, and that no similar relationship is evident when Polynesians are compared with Melanesians, Micronesians and Indonesians, except mainly in adjacent areas of direct contact.

A study of Easter Island blood groups by Etchevery (1967:690-691) notes:

> The islands [of southeast Polynesia] were possibly then, as they are now, a meeting place of routes to Micronesia, Indonesia and Polynesia in the west and America in the east.

Results

The main focus of this paper is a comparison between Peru and the North Coast and Northeast regions of Easter Island. These two regions are chosen due to their importance in Heyerdahl's hypothesis. The reader is encouraged to refer to Chapman (1993) for detailed comparisons between Peru and all five regions of Easter Island. Heyerdahl (1989) mentions that many of the archaeological features found in the eastern area of the island are similar to ones in Peru. Also, as mentioned earlier, Gill (1988) notes the genetic boundary between the populations at Ahu Nau Nau on the North Coast and Ahu Mahatua in the Northeast, suggesting that the Miru royal lineage was actually located along the North Coast. Therefore, if South American genetic influence is present on Easter Island, it would logically be found in the Northeast region and not in the North Coast region.

Significant differences between Peru and the five Easter Island regions are found in a total of 26 traits. Peru significantly differs with the Northeast in 11 traits and with the North Coast in 17. Excluding the nine traits that differ signifi-

cantly between Peru and all five Easter Island regions, there remain only ten traits in which either the North Coast or Northeast regions differ significantly from Peru. These traits include: Lambdoidal wormian ossicle, parietal notch bone, supraorbital foramen, frontal foramen, accessory infraorbital foramen, frontal grooves among males and among females, zygomaticomaxillary suture, palate form and nasal spine form (see Table 1; please note the small North Coast sample sizes for several of the traits).

TABLE 1
Frequencies of Trait Occurrence
* Indicates significant difference with Peru

Trait	Peru	Northeast	North
Lambdoidal Ossicle			
n =	188	51	3 6
present	75.5%	74.5%	91.7%*
Parietal Notch Bone			
n =	194	55	3 2
present	19.6%	10.9%	3.1 % *
Supraorbital Foramen			
n =	200	70	49
present	41.5%	68.6%*	42.9%
Frontal Foramen			
n =	2 00	69	47
present	25.0%	21.7%	8.5%*
Accessory Infraorbital Foramen			
n =	188	60	4 1
present	30.3 %	28.3 %	2.4 % *
Frontal Groove Males			
n =	100	3 4	25
present	37.0%	29.40%-.	12.0%*
Females			
n =	96	3 1	2 1
present	27.1%	58.0%*	4.8%
Zygomaticomaxillary Suture			
n =	100	3.3	24
angled	50.0%	36.4%	16.7%*
curved	50.0%	63.6%	83.3 %
Palate Shape			
n =	96	29	22
parabolic	40.6%	41.4%	100.0%*
elliptic	59.4%	58.6%	0.0%
hyperbolic	0.0%	0.0%	0.0%
Nasal Spine			
n =	98	24	13
none	0.0%	4.2%	7.7%*
small	37.8%	50.0%	38.5%
medium	28.6%	20.8%	30.8%
large	33.7%	25.0%	23.1%

The Northeast region displays tremendous similarities with Peru in frequencies for the presence of lambdoidal wormian ossicles, parietal notch bones, frontal foramina, accessory infraorbital foramina and frontal grooves among males. Other similarities are found when the shape of the zygomaticomaxillary suture, palate and nasal spine are examined. In all the above traits the North Coast region of Easter Island displays significant differences with the Peruvian sample. In only the presence of supraorbital foramina and frontal grooves among females does the North Coast region not differ significantly from Peru.

Frequencies for the presence of accessory infraorbital foramina are particularly striking. While the Northeast region and Peru both have the foramina in over 25%, the North Coast region displays a frequency of only 2.4% which is similar to the 5.1% found by Kellock and Parsons (1970) for Polynesians.

Another interesting pattern is found for the palate shape. The shape of the palate is classified as either elliptic, parabolic or hyperbolic according to Olivier (1969). The parabolic palate is present in 100% of the North Coast sample but in less than 50% in both the Northeast and Peruvian samples. Among Polynesian populations the parabolic palate is found in 96.2% of Marquesas Islanders (Chapman 1992), 93% of New Zealand Maori, 92% of Chatham Island Moriori and 85% of

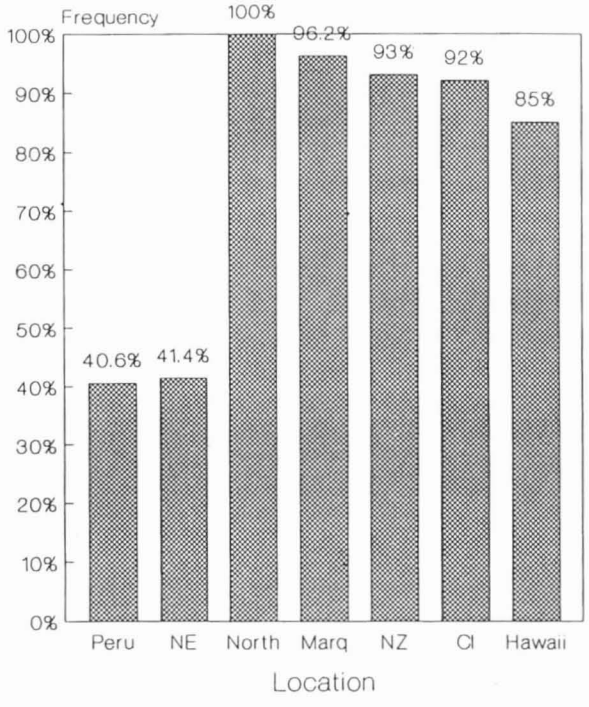

Figure 2. Graph showing frequences of parabolic palate.

Hawaiians (Marshall and Snow 1956) (Figure 2). Of the four island populations mentioned, the elliptic palate is only found in 4% of the Hawaiian sample. In contrast, the elliptic palate is found in 58.6% of the individuals in the Northeast region.

In addition to the traits mentioned above, five additional traits display interesting patterns. The traits (Inca bone, epiteric bone, metopic suture, auditory meatus form and supraor-

bital ridge form in males) are important due to differences in occurrence between American Indian and Polynesian population groups (Table 2). In each case the Northeast region shows similarities to the Peruvian sample. The Northeast region is the only region in Easter Island in which the Inca bone is present. The Inca bone is common among Peruvian Indians, reaching frequencies as high as 30% (Brues 1977). The North Coast region displays no evidence of either the metopic suture or the slit auditory meatus while both traits are found in the Peruvian and Northeast samples. The metopic suture is also not found in Kellock and Parsons' (1970) Polynesian sample nor in another Polynesian sample comprised mostly of Marquesas Islanders (Chapman 1992).

TABLE 2
Frequencies of Trait Occurrence

Trait	Peru	Northeast	North
Inca Bone			
n =	99	29	21
present	6.1%	3.4%	0.0%
Epiteric Bone			
n =	181	38	20
present	17.7%	23.7%	5.0%
Metopic Suture			
n =	98	33	18
present	3.1%	3.0%	0.0%
Auditory Meatus			
n =	99	34	32
slit	29.3%	2.9%	0.0%
Supraorbital Ridge (Males)			
n =	49	18	14
slight	30.6%	22.2%	7.1%

Discussion of Results

Considerable regional variation for non-metric trait frequencies exists on Easter Island. This is in accord with the tribal endogamy practiced on the island (Métraux 1940; Zimpel and Gill 1986). For the traits in which the North Coast and Northeast differ, the North Coast tends to show similarities to other Polynesian populations while the Northeast shows similarities to the Peruvian sample.

Two of the ten traits mentioned earlier that display significant differences between Peru and the Easter Island regions, palate shape and zygomaticomaxillary suture, are documented to be useful in race determination (Gill 1986b). The elliptic palate is common among American Indians (Gill 1986b) but not among Polynesians (Marshall and Snow 1956). The elliptic palate is not found in the North Coast sample (n = 22) but is in 58.6% of the Northeast sample (n = 29) (fig. 3). This frequency is remarkably similar to the Peruvian sample (59.4% with n = 96) as well as a sample from West Mexico (59.7% with n = 72) (Chapman 1992).

The angled zygomaticomaxillary suture is also a common trait among American Indians (Gill 1986b). This is evidenced by the angled suture's occurrence in 50.0% of the Peruvian sample (n = 100) (fig. 4). In comparison, the angled suture is found in only 16.7% of the North Coast region (n = 24). However, it is present in 36.4% of the Northeast region sample (n = 33).

Of the ten traits mentioned, only when examining frequencies for supraorbital foramen do we find similarities between the North Coast and Peru. Frequencies for the frontal groove among females show the Peruvian sample intermediate between the North Coast and Northeast regions of Easter Island.

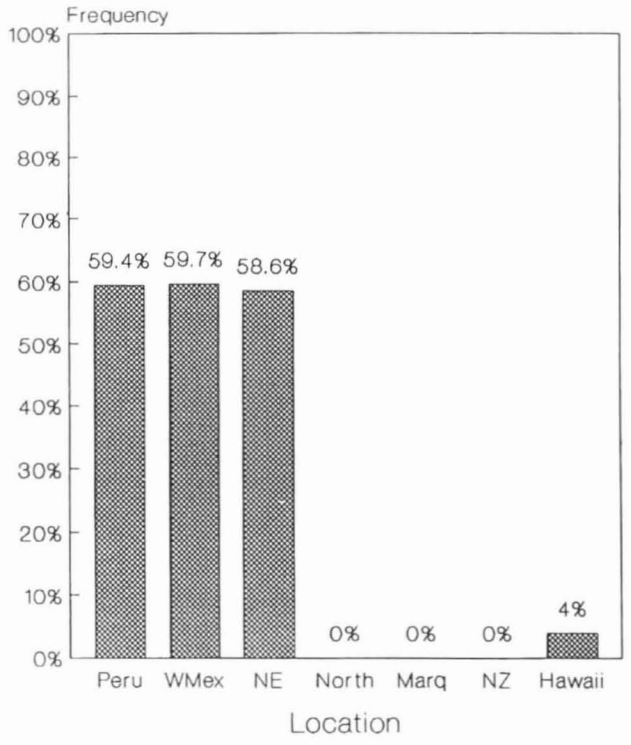

Figure 3. Graph showing frequences of elliptic palate.

Possible explanations for the differences found between the regions of Easter Island include founder effect and cultural barriers to gene flow. However, it seems unlikely that these could cause the high occurrence of the elliptic palate on Easter Island (44.3% with n = 174 for the entire population). It is very possible that the trait was acquired through gene flow from the South American mainland. While Founder Effect and cultural barriers to gene flow are possible explanations for the other differences between the North Coast and the Northeast regions it is unusual that in almost every case the Northeast tends towards the same frequencies as the Peruvian sample.

Conclusion

This study of Easter Island non-metric cranial traits supports the idea of two separate groups living on the island. It also supports the idea that these groups were roughly divided between the east and the west (Gill 1988; Métraux 1940). The North Coast population shows definite Polynesian characteristics. However, the population from the Northeast region, while most traits are Polynesian in appearance, displays many similarities to the sample from Peru.

Bellwood (1978:128-129) suggests that limited contact did take place between Peru and Easter Island during the Middle Period although it only "represents no more than a chance arrival of a raft-load of Peruvian Indians acquainted with Inca techniques of construction. Evidence for the arrival of Peruvians during the early part of the Middle Period may include the construction of Ahu Vinapu (Aliaga 1989). Ahu Vinapu is famous for its fine stone masonry. Métraux (1940:290) observes that "such a facing resembles the famous walls of the Inca palaces of the Cuzco." However, Métraux dismisses the idea that Ahu Vinapu was the result of any type of cultural diffusion from Peru. The giant *moai* statues were carved from the quarry at Rano Raraku during the Middle Period. It is also possible that the *tupa* made its appearance during this period (Heyerdahl 1961), although there is some disagreement on this point (see Bellwood 1978). Bird-man motifs were also prominent at the religious center of Orongo during this time.

Englert (1970:93-94) has recorded a Rapanui legend which mentions the arrival of a group of individuals after the

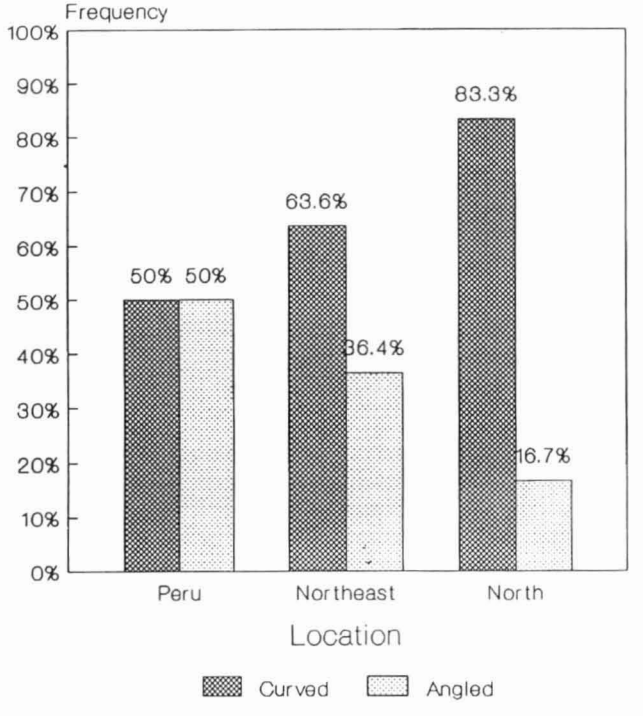

Figure 4. Graph showing frequency of zygomaticomaxillary suture.

initial settlement of the island:

> The *Hanau Eepe* immigrants are described as having included only men . . . Thus they could well have been few in number. They took wives from among the local women, and thus their descendants possessed *Hanau Momoko* heredity, but these appeared to have remained a distinct group.

Métraux (1940:71) mentions that Thomson and Vives Solar indicate that "the Long-ears had the eastern part of the island [and] the Short-ears had the whole western part of the island." Heyerdahl (1989) argues that the practice of distending the ear lobe was common in prehistoric Peru and that the Hanau eepe were long-eared Peruvians. The meaning of the term *Hanau eepe* is still debated by Rapanui scholars and is beyond the scope of this paper (see Englert 1970; Heyerdahl 1989; E. Mulloy, personal communication).

The legend mentioned above helps to explain why a small amount of apparently South American genetic influence is present on Easter Island. It also helps to explain why the genetic and cultural influence is found primarily in some regions, such as the Northeast, and not in others, such as the North Coast. Gill (this volume) has presented an alternate hypothesis for the presence of South American Indian traits on Easter Island.

The osteological data support Heyerdahl's hypothesis (1989) of a South American migration to Easter Island. However, the data indicate that the genetic influence was limited. The Rapanui legend mentioned earlier (Englert 1970) provides a possible scenario for how this influence came to the island. This scenario, a boat-load of a limited number of *Hanau eepe* men who took wives among the established Polynesian population but remained separate, is supported by the osteological results (notice that the frequencies for frontal grooves among Northeast and Peruvian males did not differ significantly while among females significant differences were found). With the marriage of South American males to Polynesian females the American Indian genetic traits would become less noticeable in subsequent generations. It is conceivable that these immigrants arrived during the early Middle Period (A.D. 1100-1200) (see Bellwood 1978) before the construction of Ahu Vinapu.

Additional osteological studies must be conducted, preferably with larger regional sample sizes, to further test the possible South American Indian presence on Easter Island. Of particular interest, and importance, would be studies of population distance comparing the Easter Island regional samples to samples from the Pacific islands and the Americas.

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EIF NEWS

THE EASTER ISLAND FOUNDATION has received gifts from two different directions for the Foundation's Biblioteca. Thanks to Helen Mitchell of Cowra, Australia, for her very kind donation of two books: the *Norwegian Archaeological Expedition*, Vol. 1, and *The Art of Easter Island.* They are welcome additions to the EIF library.

Thanks also to Elaine and Don Dvorak of Santa Clara, California, who donated a set of slides showing aerial views of Rapa Nui sites. These images are the result of kite photography. By attaching a camera to a kite, they were able to obtain excellent birds-eye views. These slides constitute an important research tool.

We are grateful for such donations and encourage our readers to keep us in mind when wondering what to do with those old photographs and slides of the island or books no longer being read.

ISLANDS V

THE INTERNATIONAL SMALL ISLANDS ASSOCIATION CONFERENCE WILL BE HELD ON THE ISLAND OF MAURITIUS FROM 7/2-5 1998

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